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High-energy laser simulator moves to Arizona

by Deb Mercurio, Directed Energy Directorate

KIRTLAND AIR FORCE BASE, N.M. — An F-16 high-energy laser weapon simulator, that will give pilots practice in using lasers to destroy targets, was transferred recently from Air Force researchers to the Fighter Weapons Training Branch in Mesa, Ariz.

Named the high-energy laser fighter, or HEL Fighter, it was developed by the Air Force Research Laboratory's Directed Energy Directorate and Air Combat Command's Theater Aerospace Command and Control Simulation Facility. The simulator is allowing pilots to become familiar with high-energy laser weapons, using those simulated weapons in tactical engagements against airborne and ground targets. Additionally, it will aid in the development of tactics, techniques and procedures for new fighter laser systems.

"The ultimate goal is to have pilots use simulators to participate in war games and determine the utility of using high-energy laser weapons against an enemy that is using conventional weapons," said Rudy Martinez, the directorate's HEL Fighter project manager.

Aiding the directorate and the simulation facility in the model's development were several Air Force and industry organizations. Lockheed Martin (local simulation facility personnel and corporate employees in Ft. Worth, Texas) integrated the F-16's fire control system and software coding. Employees from Lockheed Martin and Southwest Research Corp. integrated battlespace (the simulated environment in which the fighter would fly) into the HEL Fighter model. The directorate's Laser Effects Research Branch determined lethality values.

The New Mexico Air National Guard's 150th Fighter Wing, known as the "Tacos," participated in the simulator development by providing pilot-operator feedback. F-16 pilots were involved in the project since its inception.

According to Martinez, comments and suggestions from the 150th Fighter Wing's pilots were invaluable on a variety of issues facing this new weapon system and were included in the model development. Now, personnel in the Fighter Weapons Training Branch will provide further feedback, and the data received on F-16 laser weapon engagements will assist in determining the ability of lasers on fighter aircraft.

"The simulator is fairly accurate in representing real-world laser weapons and very accurate in target engagements," Martinez said. "Transmission losses and propagation through the atmosphere are calculated for each engagement. Target lethality is based on look-up tables at the present, and the lethality values are estimated where real values are unknown."

Martinez said that the look-up tables are lethality values for targets in a spreadsheet format, which the model can use during engagements of targets. The goal is to develop a model that calculates the values in real-time during an engagement, thus doing away with the lookup tables.

According to Martinez, the directorate's Lethality Branch is investigating the feasibility of developing a common laser target damage model that can be integrated into laser-weapon simulators. The directorate and Lockheed Martin are currently investigating the future use of laser weapons on the Joint Strike Fighter, and the HEL Fighter is a major step in that effort.

Additional weapon systems for an advanced systems war game are being planned for next September. According to Martinez, the AFRL's Space Vehicles Directorate will provide war-gaming simulator systems, and Boeing has expressed an interest in participating with their unmanned combat aerial vehicle simulator.

Martinez said that by adding more F-16 laser weapon system platforms at the Fighter Weapons Training Branch, more participation by HEL Fighters in engagement war games will be possible. The directorate and the simulation facility are in the planning stages for hosting an advanced systems war game.

"The plan is to use operational personnel to integrate and engage advanced system simulators into a theatre conflict war game," Martinez said. "How well these advanced systems perform during this war game will help engineers refine their designs and eliminate system deficiencies – a sort of simulator-based type of acquisition process, if you will." @